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GEOGRAPHIC INFLUENCES IN MARKETING ILLUSTRATED BY THE MEAT INDUSTRY[1]

GUY C. SMITH

Commercial Research Department, Swift and Company, Chicago

Marketing has to do with all the processes which involve the assembling, grading, storing, transportation, and selling of commodities. There are involved with these all the problems of insurance, the risks of ownership, and the financing of this business of distribution and the gathering and disseminating of market information.

In considering the influence of geography on marketing I have had in mind such geographic conditions as location, topography, seasonal conditions and climate. The influence of geography on marketing is chiefly indirect (thru its influence on production) but it is only slightly less certain. Professor Duncan in a recent work on marketing says, "The whole framework of trade has shaped itself to meet the difficulties and to make the most of the advantages of geographic regions." However, there are many other forces which influence marketing conditions and methods and it is frequently difficult to say which is the real determining factor in bringing about certain results.

This paper will endeavor to show how geographic conditions have exerted an influence upon our machinery of distribution, first, as related to the problem of middlemen in general, and second, as related to one industry in particular.

THE FUNCTIONS OF MIDDLEMEN

It is in line with the tendencies of modern industry and trade that the functions and processes of marketing should have become highly specialized. They have become specialized not only as to functions performed but as to products handled. And so we have various kinds of dealers for assembling and grading products; warehouse companies for storing them; transportation organizations for moving them from point of production to point of consumption; sales organizations for selling them; insurance companies for insuring

[1] This was an invited paper presented at the Chicago meeting of the Association of American Geographers—*Editor.*

them; banks for financing them; exchanges for speculative trading and for hedging transactions, and market papers and reports for providing market information. There is nothing mysterious about this development. It is no more necessary to defend specialization in business than it is to defend specialization in teaching geography, mathematics or English. All have developed out of experience. That there are evils connected with all fields of human activity scarcely anyone will deny. But it is obviously easier to voice sweeping and destructive criticism of the system than it is to offer constructive suggestions that will bring improvement.

Without considering the other forces which have played their part in the formation of present methods of distribution, let us consider the geographic forces which have been in part responsible for the development of middlemen.

Assembling

The assembling of products for the purpose of marketing is carried on chiefly by middlemen. The assembling of products is necessary for the following reasons:

1. The commodities are produced by small and widely separated producers.
2. They vary so widely in grade and quality that without assembling, it would be impossible to secure the various grades in commercial quantities.
3. They must be transferred to the principal markets where there is a demand for them.
4. They must be assembled for storage because of their seasonal production.

These facts explain the very existence of certain classes of middlemen. Wholesale receivers and commission men perform the very necessary function of assembling commodities in the quantities needed by the trade. Wide-spread production called them into existence. Their importance is increased by the fact that they must collect not only small quantities of the same product from many scattered producers, but they must be prepared to supply a variety of products to their customers, the retailers. And so the wholesale receiver or commission man in Philadelphia must collect peaches from Georgia, tomatoes from New Jersey, potatoes from Pennsylvania, and celery from Michigan. This list might be greatly extended. Viewed from this angle alone, the elimination of middlemen who perform this assembling function appears neither probable nor desirable.

But the geography of the production of commodities not only has made middlemen necessary, but it has also determined where they shall be located. Furthermore, it has determined the location not only of the local points at which this assembling is done, but the

primary markets as well. The primary grain markets are distinctly within the grain producing area, Chicago, Minneapolis, Kansas City, Omaha, Milwaukee, etc. Primary cotton markets include such points as New Orleans, Savannah, Galveston, Dallas, Montgomery, and many other towns within the cotton area. The principal tobacco assembling points are Cincinnati, Louisville, Richmond, Baltimore and a few others in the tobacco country. In the case of wool, this tendency does not at first appear so clear. With the principal wool producing sections of the United States centering in the range states of the far West and in the Ohio region, the principal wool markets of the country are Boston, New York and Philadelphia, receiving probably seventy-five per cent of the wool production of the country in normal years. Aside from these markets, Chicago, St. Louis, and Omaha are of some importance in the Middle West, and San Francisco and Portland on the Pacific Coast. But it must be remembered that domestic production supplies only about one-half of the total wool consumed in the United States, the other half coming from foreign countries. Considering this fact, Boston, New York, and Philadelphia are centrally located with respect to our total requirements. Of course, the predominance of these three markets is also due in part to the fact that the woolen mills of the country became established in the eastern section at an early date and this section has maintained its supremacy.

Grading

But dealers have other functions than assembling. They have quite largely done the grading.

The consuming public is discriminating in its purchases of foodstuffs. Since dealers were the ones most closely in touch with consumers they were the first to learn the value of proper grading and attractive packing in convenient retail units, and took on the major part of this marketing function. While producers are more and more performing this work, a considerable amount of it will necessarily always be done by middlemen because of the necessity of regrading.

Distance of producing from consuming centers has been an important factor in forcing early attention of dealers and shippers of perishable products to the subject of grading. Fruit shipping from the Pacific Coast well illustrates this point. Freight costs are of such importance that shippers cannot afford to pay freight on low grade products.

Perishables produced at a great distance from the market are bound to be graded near the point of production, while much of those

produced near the point of consumption will not be graded until they reach the hands of some middleman in the primary or consuming market.

Storage

Storage is another function of middlemen. Storage is necessary, almost solely because of the seasonal character of agricultural production. Whether for hay or eggs, storage of some form must be provided. The highly specialized storage facilities for perishables like eggs is expensive and technical and consequently has become a specialized business. For this reason this marketing function has fallen to the distributor or to a specialized warehouseman since he was in a better position than the farmer to finance it and to assume the risk of ownership, and also because of his location near the centers of consumption. Furthermore, in the beginning of storage it was necessary to accumulate the supply of food in population centers, because of the great uncertainties of transportation. This is still true tho to a smaller degree. The risks of storing are great, and large amounts of capital and credit are required. Only those to whom capital and credit are available and who are experienced in the markets can long succeed in conducting a storage enterprise.

Closely tied up with seasonal production and storage is the development of another phase of middleman distribution—the whole machinery of speculative exchanges. The necessity of holding products for some months has given rise to the elaborate system of buying and selling for future delivery for the purpose of distributing the risks of holding, and for the purpose of establishing such a price that the supply will be moved into consumptive channels at a rate that will provide an even flow of goods during the period of low or non-production. No other method has yet been devised which provides so constant and flexible a market for such a commodity as wheat, which comes from world-wide production and for which there is a world market.

Some phases of the development of middlemen which have been criticised have been very largely dominated by the fact that topography has determined the course of transportation routes. It is a popular notion that an economic waste is involved by shipping products out of a producing section to a central market and then shipping them back to consuming centers near the point of production. The truth is that this may not be an economic waste at all.

Distributing centers consist of an aggregation of middlemen surrounded by transportation facilities, warehouses, banks, and all the

equipment to facilitate trade. These centers are always located at important junction points in the transportation system and these have been determined by geographic considerations.

Distributing centers are great reservoirs into which quantities of a given product are poured from widely separated producing sections having the same or different seasons of production. From these reservoirs the product is distributed out to large and small consuming centers evenly, so that the period of consumption may be greatly increased. As a result production itself may be greatly increased and become more profitable. For example, specialized market gardening is largely on a wholesale basis. A large part of the products must be sold in a wholesale way, which means in a wholesale market. On the other hand, the retail dealer near the gardening section might find it more economical and satisfactory to buy his supplies at this same wholesale market where he can get desired grades, and the necessary assortment of product, in an even flow, over a longer period than can be supplied by the nearby producer.

These cases are perhaps sufficient to show that the fundamentals of the middleman system of distribution are natural conditions. The functions which middlemen perform are almost as necessary to the life of the people in these days of specialization as production itself. Changes are constantly taking place and will continue to take place but they are changes in details rather than in fundamentals and are not likely to result in any considerable elimination.

The Meat Industry

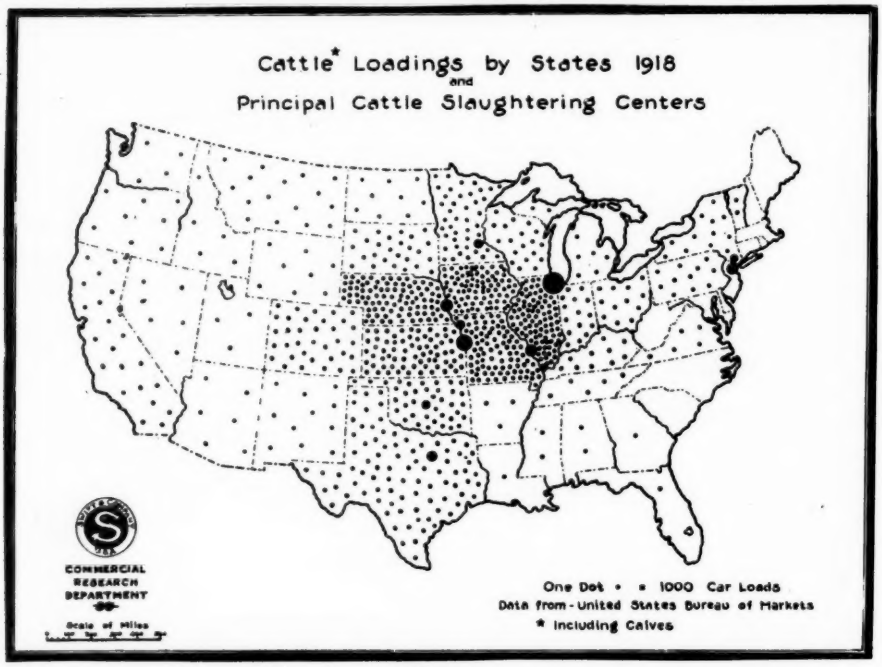
The remainder of this discussion will show how one industry, from the supply of its raw materials to the final sale of its products, is affected by these geographical conditions.

The Supply of Raw Materials

The raw material for the packing industry is the farmer's finished product.

Location of markets and slaughtering and packing plants has been determined largely by the relative location of regions of production to regions of consumption. This point is clearly brought out by maps showing the principal regions of production and the principal central markets and slaughtering points. The data of shipments for these maps were gathered by the United States Bureau of Markets. The only complete year for which they are available is 1918.

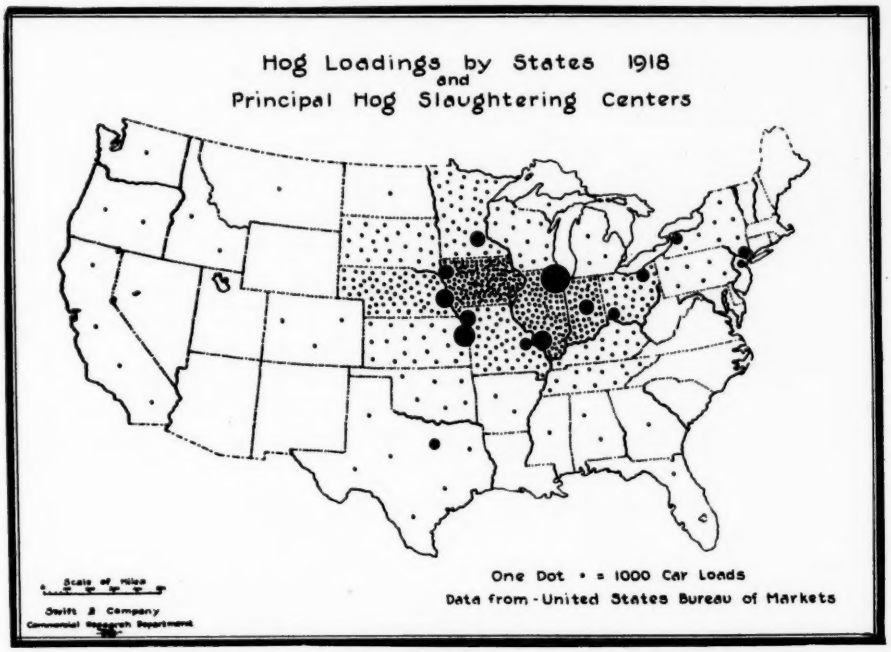
On Map 1, "Cattle Loadings by States for 1918," each dot represents 1,000 cars. The most important producing states are clearly apparent. The large dots on the map represent the principal cattle slaughtering centers, their size roughly indicating their relative importance. With two exceptions, these centers are all found within the areas of heavy production. The explanation of this is to be found in the fact that it is more economical to ship the finished products than it is to ship the raw material. A live steer weighing 1,000 pounds produces dressed meat weighing about 550 pounds. The saving in freight at once becomes apparent. Other savings result from the fact that injuries and deterioration are involved in shipping live cattle long distances.


Cattle* Loadings by States 1918
and
Principal Cattle Slaughtering Centers
COMMERCIAL RESEARCH DEPARTMENT
Scale of Miles
One Dot • = 1000 Car Loads
Data from - United States Bureau of Markets
* Including Calves

Map 1

The two exceptions in the location of cattle slaughtering plants, Jersey City and New York City, are important centers because of a factor on the demand side of the business rather than on the supply side. That is to say, there is a large Jewish population in New York City and its environs whose religious customs demand that they consume beef which has not been slaughtered longer than seventy-two hours. This limit may be extended to a maximum of nine days by certain action of Jewish church officials. The only way this demand can be fully met is by providing plants at those points. In this case, a certain amount of live stock must be shipped from the West to supply the need.

Map 2 represents the influence of producing areas upon the principal hog packing centers. This shows a greater number of large pork packing centers than was shown in the case of cattle. This is probably not due so much to geographic factors as it is to the fact that pork packing does not involve all of the conditions that have made for


Hog Loadings by States 1918
and
Principal Hog Slaughtering Centers
One Dot • = 1000 Car Loads
Data from - United States Bureau of Markets
Swift & Company

Map 2

the high degree of centralization in the business of making cattle into beef. The large part played by by-products in the case of cattle has had a great deal to do with the centralization of the industry, since only in this way could the by-products be most completely conserved.

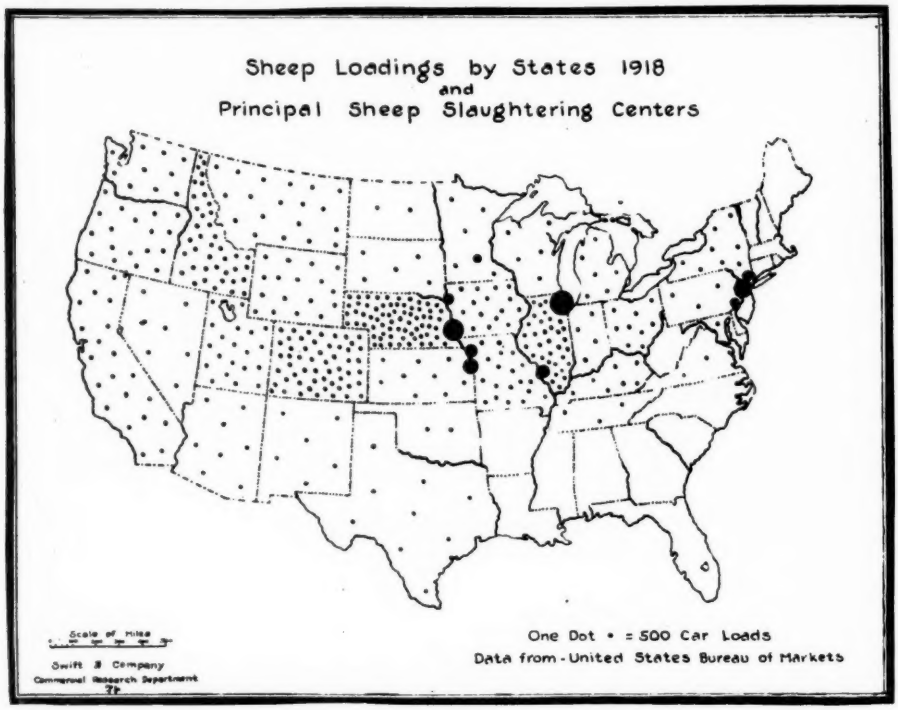
Map 3 gives the same data for sheep. Denver appears in this map. It is interesting to notice that Jersey City is one of the most important points. Again this is due in part to the demand for lamb and mutton which is greater in northeastern United States than in any other section.

Just as the seasons have a marked influence in production, so also do they have a far reaching influence on marketing. This is well illustrated in the case of the marketing of lambs.

Lambs begin moving to market first from California. This occurs in April and extends thru June. Then come Texas lambs running thru May, June, and July. These are followed by lambs from Ken-

tucky and Tennessee which begin coming in June and extend thru August. These are followed by lambs from Virginia and Maryland in July and August. Spring lambs from the north central states are marketed chiefly from July to November and from eastern Canada during September and October. The lambs from the range states run from September to November while the fed lambs from the north central states are marketed from December thru to April.

Much the same thing happens in the case of the seasonal sources of cattle. These shifting sources of supply constitute another of the important reasons for the development of the meat packing industry


Sheep Loadings by States 1918
and
Principal Sheep Slaughtering Centers
Scale of Miles
Swift & Company
Commercial Research Department
One Dot • = 500 Car Loads
Data from - United States Bureau of Markets

Map 3

in highly centralized markets and large scale organizations. The business of collecting live animals from the scattered western territory and distributing the products chiefly thru the eastern and southern United States compels organization on a national basis so far as a considerable part of the industry is concerned. To attempt to conduct this business by small, local plants scattered about the whole producing area would be uneconomic because the local supply in many of the western sections would be so highly seasonal that the plants could be operated but a small portion of the year.

An excellent illustration of the influence of the seasonal supply of raw material upon the location of plants is found in the marketing of poultry in the Middle West. Briefly stated, poultry marketing in Missouri and nearby territory is more evenly distributed thruout the year than it is in the Northern states like Minnesota, where the bulk of it occurs during October and November. This has had an influence on the location of Swift & Company's produce plants. That there are none in Minnesota is due in the main to the fact that most of the poultry is marketed in a short period in the late fall and very little during the rest of the year. Under these circumstances produce plants for the handling of poultry cannot be economically operated.

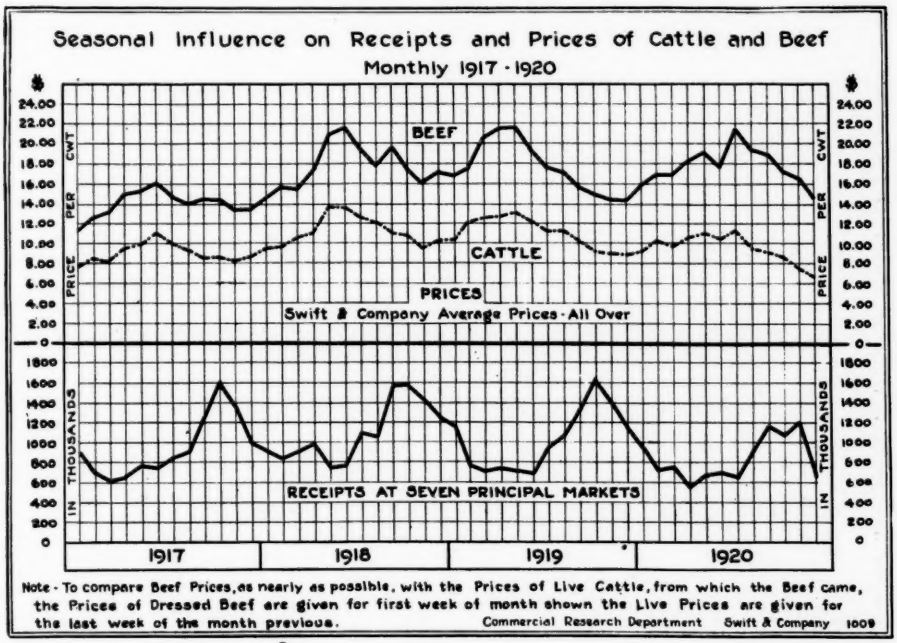


Fig. 4

Distribution of Products

Let us turn now to the other end of the business, that of distributing the finished products. The demand for meat is a demand for certain cuts of meat. This demand will fluctuate with the supply and with the price, not only of the cut under consideration, but with the price of other cuts as well. The demand also fluctuates with a change of seasons and with a change of weather. For example, cooked meats like ham, sausage, and dried beef which can be used for cold lunches and picnics during the summer are in great demand during

that season, while the demand for fresh meats is greatest in winter. On the other hand, the demand for fresh pork, particularly fresh sausage, is affected in the early part of the winter by the farm butchering which takes place at that season of the year. A snowstorm or a sudden cold spell increases the demand for meat appreciably.

It is roughly true that two-thirds of the live stock of the country is produced west of the Mississippi River, while two-thirds of the population is east of that line. Over this eastern territory there is, of course, local production and local slaughter, but a large part of the meat supply of this great consuming area must come from west of the Mississippi. The problem of distributing a highly perishable product from Maine to Florida in the heat of August as well as in the cold of January has had its effect on the character of the machinery for doing the work as well as on the organization for handling this machinery.

Two methods of distribution have been developed to take care of the different conditions existing in the different parts of the country. For the larger consuming centers, the branch house is used. A branch house is a wholesale meat supply station which distributes to retailers within a limited territory. It gets its supplies in car lots direct from the company's plants.

The more sparsely settled sections of the country are supplied by car routes. Car route distribution is accomplished by sending a salesman out from a plant to visit the retail meat dealers along a line of railroad. The orders he receives from them are returned to the plant and a refrigerator car loaded accordingly. This car travels the same route that the salesman took and drops off the orders at the proper stations.

Branch houses then are located where urban population predominates, while car routes cater to those sections where population is more sparse.

The geography of the industry, coupled with the fact that highly perishable products are involved, is such that the successful national distribution of these products must be based upon two achievements—speed and refrigeration. Rapidity of service is necessary for success. But rapidity of service can best be attained by centralized control of a sufficient amount of equipment and facilities to provide distribution on a nation-wide scale. There must be refrigeration at the slaughtering plants, there must be refrigeration in transit and there must be refrigeration at the branch houses. Furthermore, there must be an organized personnel all along the line trained to extreme sensitiveness to delays and on constant guard day and night to avoid them.

The people of the United States consume over 50,000,000 pounds of meat per day. Beef steaks are available to Florida in July as well as January. The greatest contribution of the meat packing industry to the people of the United States has been the development and perfection of the refrigerator car. The only hope of overcoming the geographical obstacle of distance was in having an organization geared high to produce speed. To overcome the natural obstacle of varying temperatures, it was necessary to have equipment to provide an *even* temperature.

There are many other ways in which geographical conditions affect this industry, but I shall refer to but one of them. The wholesale prices of fresh meats are as responsive to seasonal changes as is the supply of live stock. This is illustrated by my last chart—"Seasonal Influence on Receipts and Prices of Cattle." The bottom curve on this chart shows the seasonal variation in the receipts of cattle on the seven principal live stock markets. It shows that the heavy receipts of cattle come in the months of October and November each year with slight variations. The middle curve shows the average price which Swift & Company paid for cattle. The effect of seasonal variation in receipts is apparent. The top curve shows the average wholesale price at which Swift & Company sold its beef. This curve closely parallels the one below it. This is perhaps the most striking illustration that has been offered in this paper of the effect of geographic influence on the meat industry.

In conclusion, research in economic geography is invaluable to a clearer understanding of marketing problems. There seems to be an all too common notion that present day marketing methods and organization are simply the whims of men. But geography can point out some of the fundamental factors which must not be neglected.

PREPARATION FOR TEACHING CLIMATE

STEPHEN S. VISHER

Indiana University, Bloomington, Ind.

The Importance of Climate and of a Knowledge of Climate

There is much evidence supporting Ellsworth Huntington's thesis that a favorable climate has been a prerequisite to an advanced civilization. Undoubtedly change in climate has been one of the great driving forces in history. It ranks with the other agencies of progress, such as discovery and invention, the spread of learning, Christianity, disease, the increased use of natural resources, and the accumulation of capital. In addition, changes of climate have probably been highly influential in the evolution of plant and animal life.[1] Climate largely determines where each of the many kinds of plants and animals can live, and as a result of this, a large and increasing share of the world's commerce is in commodities which can be more successfully produced in one climate than in another. Climatic fluctuations in any given area also profoundly influence the yield of crops, as J. Warren Smith has so clearly pointed out.[2]

Any influence which affects us so persistently, directly and subtlely as climate should be understood by at least the leaders of civilization—those who have a high school education or more. The need for knowledge as to climate is evident in various ways: (1) In order to understand the character and actions of peoples in other lands it is necessary to understand the climatic conditions under which they live. When the climatic handicaps against which certain peoples struggle are known, we appreciate that the climate, and not man, is often to blame for the backward condition of roads and education. (2) In order efficiently to use our own area and other areas under our control, a full knowledge of the climate of each part is necessary. It is not enough that a few specialists should have this knowledge. Specialists are seldom consulted except by those who already know a good deal about a subject. (3) A knowledge of the climate of other regions is necessary in order to trade with them in the most successful manner.

[1] N. S. Shaler: "Nature and Man in America"; J. Barrell: "Probable Relations of Climatic Changes to the Origin of the Tertiary Ape—Man"; Scientific Monthly, Vol. IV, (1917), pp. 16–26; W. D. Mathew: "Climate and Evolution"; Annals N. Y. Acad. of Science, Vol. 24 (1915), pp. 171–318; E. Huntington: "World Power and Evolution," 1919.

[2] Agricultural Meteorology, 1920.

Not only should the American importer know what the foreign region can produce with proper encouragement, but the American exporter should know what his own country can produce more advantageously than other regions and which of these products a given foreign region can be encouraged to use. As an example of this point, the failure of an American plow manufacturing company to supply light enough plows in Turkey, is illuminating. There was a market for plows, but the small oxen and dry soil of Turkey demanded smaller plows than is customary in the United States. The German company which recognized the climatic needs got the trade. Finally, the shipper must know the climate of the regions thru which his goods pass in order that the goods may be packed properly to insure safe delivery.

Why is it that those who have studied climate in a high school or college course in physiography often have so little knowledge of the subject? Is it not usually because the teacher himself did not really understand climate or appreciate its importance, and as a result did not succeed in properly emphasizing the fundamentals? Why have successful teachers of other aspects of physical geography made a comparative failure of climate? Is it not because climate is such an exceedingly complex subject? It is not sufficient to know a few facts about our own climate. Considerable knowledge of at least a dozen climates is almost essential for any teacher of climate or for any leader among men of affairs who would make the most of the opportunities in world trade, world politics and world advancement.

In order that even the better students may obtain a usable knowledge of climate in the time available in a high school, normal school, or early college course in physical geography or physiography, it is necessary that the teacher be specially prepared. He must appreciate keenly not only the importance of a knowledge of climate, but the complexity of the subject, and the necessity for clear reasoning about it. He must know what influences cooperate to make the climate what it is. He must understand a number of meteorological laws, the operation of which determine the local climate. He must have the great framework of the chief climates clearly in mind. He must know a few climates in considerable detail. A framework is not enough. Local conditions often produce important effects, hence, for a few areas the framework should be supplemented by the effects of local conditions. Only thus may a concrete, vivid knowledge be obtained. Brief suggestions which may be helpful to those trying to meet these five needs are given here. Needs three and four receive most consideration.

The teacher may obtain a keen appreciation of the importance of climate by reading Ward's "Climate in Relation to Man," Huntington's "Climate and Civilization," "World Power and Evolution," and his "Principles of Human Geography," and Semple's "Influences of Geographic Environment," Chapter 17.

CLIMATIC FACTORS

The terrestrial influences which determine the climate of a place receive some consideration in Ward's "Climate," in Salisbury's "Physiography," and similar books, and in most meteorologies.[3] Briefly, they are latitude, altitude, relation to the ocean, relation to a large land area, relation to nearby great relief features, relation to lesser water bodies, local topographic features, slope, soil, vegetation (forest, brush, and grassland.[4]

ESSENTIAL METEOROLOGICAL LAWS

In order that the climatic factors, or the influences controlling climate, may be understood, a number of meteorological laws must be held clearly in mind. Twenty-five such laws may be stated briefly as follows:

Group I. Temperature

1. The earth's surface is warmed chiefly by solar radiation, and to a lesser extent by radiation from the warmed atmosphere.

2. The earth's surface is cooled chiefly by outward radiation to the overlying air, which is thereby warmed and then usually rises carrying the heat to higher levels where it readily escapes to space. A secondary method of cooling is that which accompanies evaporation and thawing. A third method, radiation to space, is also important in high altitudes and in dry regions.

3. The lower atmosphere is warmed chiefly by the absorption of terrestrial radiation and to a minor degree by the absorption of solar radiation.

4. The lower air is cooled chiefly by convection, i.e., the rising of the warmed air, and subsequent radiation to cooler air and into space. It is sometimes cooled by radiation to cooler land or water.

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[3] Milham: "Meteorology," 1912; Humphreys: "Physics of the Air," 1920.

[4] Atmospheric and solar influences help determine the climate of any place. The amount of volcanic dust, carbon dioxide, and ozone in the air is different in different places and times. Solar radiation also varies in intensity and kind. The influence of these agents is not, however, thoroly established as yet. They are discussed in Humphreys' "Physics of the Air," and Huntington's "Climatic Changes, Their Causes and Geological Relations," (1921).

5. Vertical rays from the sun are more effective in warming the earth than are oblique rays; the more oblique the rays, the less heat received. Rays which are reflected from the earth have no effect on terrestrial temperature.

6. As all atmospheric molecules and especially water vapor interfere with the passage of heat, the drier and the thinner the air the greater the heating by rays coming from the sun at a given angle, and the more rapid the cooling by night and in the shade.

7. Heat is carried from place to place mostly by winds and to a lesser extent by ocean currents.

8. Water warms less easily and more slowly than land, and cools more slowly because (a) the specific heat of water is about twice that of land; (b) water is warmed to a greater depth, because of transparency and convection, and hence the surface layer is not warmed so much; (c) there is more reflection from water than from land; (d) there is usually more evaporation from water than from land. The slower cooling of the water is because of (a) and (b), and because water vapor and clouds are more abundant over water than over land. Water vapor and clouds hinder the escape of heat.

9. The temperature of an object increases until the loss of heat equals the addition of heat. When the loss and the gain balance, the temperature remains constant. When the loss exceeds the gain, the temperature falls. Therefore maximum temperatures occur after the time of maximum heating, and minimum temperatures occur after the time of maximum loss of heat by radiation. In other words, there is a daily and seasonal lag.

10. Evaporation is a cooling process; when condensation occurs, as much heat is released as was required to evaporate the condensed vapor. However, since most condensation occurs high up in the air where the heat can easily escape to space, the final result of evaporation is usually surface cooling.

11. Rapid descent warms air while rapid ascent cools it. The adiabatic cooling of dry air while ascending is at the rate of 1° F. for each 200 feet, approximately.

As a summary of these laws of heating it may be well to picture the cycle due to their joint action. The sun rises; its rays penetrate the air but are absorbed by the dark soil which thereby is warmed and gives out long heat rays which are absorbed by the air. As the air becomes warm it expands. Winds are set up, and the heated air is moved away and warms other places where the sun's heating is less effective. Sometimes the air rises and is therefore cooled adiabatically, occasionally

enough so that its moisture is partly condensed with a liberation of heat which still further warms the air. Gradually the heat escapes outward to space or downward to cooler earth and water until the air is no longer relatively warm. Then gravity pulls it down to the earth's surface where it awaits another warming the following day.

Group 2. Winds

12. Relatively cold air tends to sink, and crowd under warmer air, thus forcing it to rise. This is because cooling causes contraction and warming causes expansion, and hence a given volume of cold air is heavier than a like volume of warm, expanded air.

13. Winds always blow from places of higher air pressure to places of lower air pressure, because the great force producing winds is gravity.

14. Winds are deflected by the rotation of the earth; to the right in the northern hemisphere and to the left in the southern. The extent of deflection increases with latitude.

15. Winds blow at a large angle with the isobars if there is much friction and at a small angle if there is little friction. In other words, if there is little friction the air circulates around and around a center of low pressure, while where there is much friction it approaches the center of the low more directly.

16. Surface winds are influenced by topography and surface temperature. Winds tend to descend slopes, to follow valleys, to go toward warm areas, and to avoid elevations and cold areas.

17. Wind velocity depends on the barometric gradient, or difference in air pressure per horizontal unit, and upon the amount of friction; the steeper the gradient and the less the friction, the stronger the wind.

Group 3. Moisture

18. The ability of air (space) to hold moisture increases sharply with increased temperature, doubling with each increase of approximately 20° F. (10°C). In other words, as the temperature rises the relative humidity falls; this in spite of the fact that the absolute or actual humidity is increased with increased temperature whenever there is water which may be evaporated.

19. Atmospheric moisture is derived by evaporation from all moist surfaces, chief of which is the ocean.

20. The rate of evaporation increases with increased temperature and wind velocity and with decreased relative humidity. It is also

increased slightly by decrease in air pressure, in absolute humidity and in the salinity of the water.

21. Atmospheric moisture is transferred chiefly by wind and the vertical moving of air called convection. (Diffusion, the other process of transference, is altogether subordinate.)

22. Condensation occurs when moisture is cooled below the saturation point or dew point.

23. The amount of condensation depends upon the absolute humidity of the air, the amount of vapor cooled, and the extent of cooling beyond the dew point.

24. Precipitation occurs whenever drops, flakes or pellets are formed which are too heavy to be sustained in the air by the rising air currents.

25. Precipitation is heavy when a large volume of warm moist vapor is cooled notably below the saturation point.

As a summary of these laws of moisture, it may be well to describe the cycle often gone thru. The sun rises over the ocean and the air is warmed. It thereupon becomes able to hold more moisture and evaporation is facilitated. As the air is blown over the moist surface, it takes up moisture, rapidly if it can hold much more than it already has, and slowly if it is nearly saturated. The wind blows upon the land carrying moisture from the ocean. It encounters a mountain range and is forced to rise. In doing so its temperature is lowered. At a moderate height it is cooled sufficiently so that it can no longer hold all its moisture and clouds form. At a higher elevation a drizzle is produced. If the range is high or if convectional overturning takes place, rain falls until the excess moisture has been precipitated.

These twenty-five meteorological laws are explained in advanced physiographies and meteorologies, tho not always satisfactorily. They are by no means too strongly emphasized in textbooks. Every teacher of physical geography should be able to state and explain the substance of these laws at any time. Consequently, prospective teachers of geography should be given them in concise form.

Helpful Climatic Generalizations or Laws of Climate

Generalizations as to the normal distribution over the earth of various climatic elements such as heat, wind, and moisture, are often distinctly helpful. In practice I have found two kinds of generalizations especially helpful. In the first, the normal distribution is stated as concisely as possible. In the second, the climatic conditions of

imaginary areas are surmised. Obviously, the value of such a summary of climate as the first does not depend upon its pedagogical utility. Few teachers may think it wise to teach climate by the conspicuous use of zonal averages. They may think it unwise to ask students such questions as "What is the average temperature, relative humidity, precipitation, etc., at latitude 50° N. on the continents?" There are strong arguments in favor of a concrete discussion of a climate as it actually is, instead of considering what it would be if various more or less local factors were not operating and making it peculiar. However, most teachers and prospective teachers are benefited decidedly, according to my experience, by having such generalizations clearly in mind. In discussing the use of these generalizations with some teachers who advocate teaching by the use of concrete examples, I have been impressed by the fact that they themselves use similar generalizations. Moreover, their generalizations usually are not very concise or accurate. Thus the conclusion seems warranted that generalizations are necessary if the students' knowledge of climatology is to be more than a mass of more or less meaningless data.

The thirty-six climatic generalizations which I have found most useful are given here very briefly.[5]

Group 1. Heat

1. Half the earth is being heated at a given moment by the sun's rays, the great source of heat. Because of the earth's rotation there is a progressive change in the area heated.

2. Normal temperatures decrease with increase in latitude from an average of about 80° F. near the equator to about 45° F. in about latitude 45°, and to about 0°F. near the poles, or at a rate of nearly 1°F. for each degree of latitude.

3. Many places are warmer or colder than normal because of the influence of winds, as winds commonly affect local temperature. The effect is conspicuous along coasts where winds blow from the sea, near mountains and in high latitudes. Winds from the ocean commonly warm cold lands and cool hot lands. For example, Ireland is called the Emerald Isle because winds from the ocean in winter keep it warm enough so that grass continues green. Winds from higher latitudes

[5] A very much fuller statement of these and of many other generalizations which seem less valuable for teachers has been prepared. It will be published soon in the *Monthly Weather Review* as "Laws of Climate." Citations to authorities are given in full in "Laws of Climate" and hence are omitted here.

commonly bring lower temperatures while winds from lower latitudes commonly raise temperatures. In other words, northerly winds are cold and southerly winds warm in the northern hemisphere. Rapidly descending air often warms by its dynamic heat. For example, chinooks or foehns frequently raise temperatures on the leeward sides of mountain ranges.

4. Normal temperatures decrease with increase in altitude, about 1°F. for each 300 feet rise from the earth's surface. The fall in nocturnal temperature is at a somewhat greater rate. At an elevation of 2000 feet above sea level the effect of altitude is appreciable, and at 4000 feet it is marked.

5. Nearly all parts of the earth, except the polar regions, are heated for a short time by the sun and then are cooled by nocturnal loss of heat.

6. Day and night vary significantly in length near the solstices in middle and high latitudes. Long days make summer warmer and long nights make winter colder than they would be otherwise. The maximum disparity between day and night increases with latitude. It is slight at 30° and extreme at the poles where day and night are six months long. At latitude 50° N. July days average 15.8 hours in length.

7. Seasons of temperature occur in middle and high latitudes. In low latitudes all months have essentially the same temperature, while in latitude 50° there is an average difference of about 45° F. between the July and the January mean temperatures. Seasons are a result of the migration of the heat equator and associated climatic belts, which shifting occurs as the earth revolves around the sun. The shifting is produced by the constant inclination of the axis to the plane of the earth's orbit and by the axis always pointing to the same part of the heavens.

8. Land is notably warmer than ocean or deep lakes in warm regions and in summer. It is cooler in winter. Land is cooler than water at night and warmer by day, except where the winters are cold, in which case land is cooler than water even by day. Europe affords good examples of the seasonal relationship. Between 47° N. and 52° N., for each 10° of longitude farther from the west coast there is an average decrease of 3.1° C. (5.4° F) in winter, but an increase of 0.7° C. (1.3° F.) in summer.

9. Daily range of temperature increases with decrease in the influence of oceans and lakes, as does also seasonal and annual range. Marine climates have slight range while continental climates have

great range. The air over the ocean normally varies less than 4° F. from day to night, while the average range over the continents is more than three times as great, and in continental interiors it is often ten times as great.

10. Range of temperature increases with increased aridity upon the land. Deserts often have daily ranges of 50° F.; humid areas seldom have a range of more than 30°F. and commonly have less than 20°F.

11. Variation in temperature among the days, months, seasons, and years increases with latitude up to the polar regions. In low latitudes all days and years are much the same. In middle latitudes no season or year is "normal" and there are great contrasts among successive days. This variability is illustrated by Hann's statement that the average of forty years in Europe would not be any closer to the mean than the average of two years in Java.

Group 2. Winds

12. Surface winds often blow from colder areas to warmer areas because warm areas usually have lower air pressure than nearby colder areas. The trade winds, land and sea breezes, monsoons, and valley and mountain winds all illustrate this principle. Poleward blowing winds accompanying cyclonic storms form the great exception to this rule.

13. A great system of winds (the planetary circulation) results from the combined influence of intense equatorial heating and of the earth's rotation. High average temperatures produce a belt of low pressure along the thermal equator. A belt of high pressure is produced, chiefly as a result of the earth's rotation, in latitude 30° or so north and south. From the higher parts of this belt, winds blow toward the heat equator (the trades) and spirally toward the poles (the westerlies in part).

14. Wind direction aloft is more to the right than nearer the surface (see Meteorological Law 15 above).

15. Average wind velocities increase with latitude to about 50° N. and S. with an increase in the average vertical temperature gradients; that is, the difference in temperature between the surface air and that say a half mile above the surface. Storminess also increases in general to about those latitudes and storms help increase the wind velocity.

16. Surface winds average stronger over smooth regions than over less smooth in the same latitude. The surface wind velocity over the ocean averages twice that over the land.

17. Wind velocity normally increases with altitude. This increase is rapid immediately over an area of much surface friction and less rapid over an area of little friction. On the average in the open in eastern United States the wind velocity forty feet above the surface is five miles per hour more than at five feet above the surface.

18. Wind velocity averages greater in winter in mid-latitudes than in summer because of steeper temperature gradients, increased storminess and lessened surface friction.

19. There is commonly an increase in velocity of surface winds during the day until the time of greatest convection which usually is about 3 or 4 P. M. This is because the vertical movement of the air known as convection knits the surface layers with the rapidly moving ones above which can thus drag the lower air along. In many places the velocity averages twice as great in the mid-afternoon as in the early morning. At Kew, England, the average daily range is six miles per hour in summer.

20. Calm nights are characteristic of trade wind deserts and other deserts and are common elsewhere on the land, particularly on warm lands. Calm nights are abnormal upon the sea, because little nocturnal decrease in temperature and hence in convection occurs there.

Group 3. Moisture

21. The ocean is the great source of atmospheric moisture. It covers four-fifths of the warmer half of the globe, in which half more than three-quarters of the total evaporation takes place.

22. The rate of evaporation falls off with increases in latitude and altitude and with approach to marine conditions. On the average, evaporation from water bodies exceeds precipitation in low latitudes. It exceeds it greatly in the trade wind belt, where 150 inches or more evaporates from the ocean. On the average, precipitation exceeds evaporation in high latitudes (see Meteorological Law 20).

23. Windward sides of continents and mountain ranges are much more moist than lee sides (see Meteorological Law 21). The relative humidity on windward coasts approaches 85 per cent while on the lee of mountain ranges it falls off to 50 per cent or less.

24. The average actual or absolute humidity decreases with increase in latitude. Water vapor makes up an average of 2.63 per cent of the surface air at the equator, 0.92 per cent at latitude 50° N., and 0.22 per cent at latitude 70° N.

25. The absolute humidity commonly increases with the temperature during the day and in the year, while the relative humidity aver-

ages least in the warmest hours in the day and in the warmest months of the year. See Meteorological Law 18.

26. The products of condensation (dew, frost, fog and cloud) are most frequent and widespread wherever and whenever cooling involving the saturation or dew-point occurs oftenest.

27. Condensation is heaviest in warm moist regions. Hence, dew increases in amount and clouds in density and thickness with decrease in latitude or aridity. In middle latitudes heavy dews seldom exceed 0.01 inch of water, but in the rainy tropics they sometimes exceed 0.1 inch. In polar regions the clouds are usually thin, while over the equator they are very dense.

28. The amount of precipitation decreases irregularly with increase in latitude, from an average of about 100 inches along the equator, to less than 10 inches in the polar regions. (Parts of the trade wind belt are dry but other parts—windward slopes— are very wet).

29. Variation in the amount of precipitation from season to season and from year to year increases in intensity with increased aridity. Disastrous floods are almost more common in deserts than they are in rainy regions.

30. The distribution of precipitation thruout the year depends on (a) intensity of convection: most areas have most rainfall when convection is greatest; (b) wind direction: winds from the sea and from lower latitudes bring rain; (c) comparative temperatures of land and water: in general, precipitation occurs on the land when it is cooler than the water; (d) storminess: storms induce a large share of the precipitation of storm-affected regions.

31. Two diurnal maxima and two minima of precipitation occur. The maxima are at 2 to 5 P. M. and 3 to 6 A. M.; and the minima are at 9 to 12 A. M. and 11 P. M. to 2 A. M. Some places have their maxima in the afternoon and others in the early morning.

Group 4. Miscellaneous

32. The temperature often seems warmer or colder than the thermometer indicates. Sunshine and calm feel notably warmer than shade and wind. Dry air feels warmer than moist air below about 50° F. Above 55° F. moist air feels the warmer.

33. Air pressure decreases with increase in altitude. At 5,000 feet the deficiency of air pressure has appreciable effects on some climatic elements, particularly on the rate of cooling in the shade and directly on a few people, making them nervous. At 10,000 feet the deficiency

is noticeable, and at 15,000 feet most men are strongly affected, being made dizzy and weak.

34. Many mountain valleys and lee slopes have a peculiar climate because of foehn or chinook winds. Temperatures and sunshine average abnormally high in such areas.

35. Cyclonic storms are frequent in mid-latitudes and dominate the weather there. They are great whirls, a thousand or so miles across, which move eastward at a rate of about 400 miles a day in summer and 800 miles in winter. They produce striking changes of weather. The "lows" cause precipitation in wide areas where precipitation would be scanty otherwise.

36. Typhoons or tropical hurricanes are whirling storms which occasionally powerfully affect wide areas near the margins of the tropics, causing much precipitation and destructive winds.

Climates of Imaginary Areas

The second great sort of climatic generalization which I have found helpful consists of a tabular statement as to normal temperatures and temperature ranges; precipitation—its amount, distribution and variation; wind direction, reliability, velocity; humidity; sunshine, etc., for each of numerous ideal areas. "If a symmetrical continent extending from the equator to the pole be imagined, what types of climate would occur and what would be the climatic conditions in each type?" The teacher of elementary pupils may consider only six or eight great types, while the teacher of advanced students should consider a much larger number. Twenty or more distinct climates would occur on such a continent if a lofty mountain range extended from equator to pole.

Climates of Actual Areas

Another step preparatory to teaching climate should be a study of actual areas. The data usually available will be found to resemble closely those deduced for the imaginary areas. The departures are due to influences which usually can be recognized promptly. The more important data for typical stations in each of the great climatic regions should be arranged for graphic display. By the use of a few symbols it is possible to present practically all essential data.

Order of Presentation

The decision as to where to begin is also important. So far as climatic types are concerned, there is much in favor of starting with

the rainy tropical lowlands. There the effects of the two great variables, heat and moisture, are at their maximum. The monsoon climate may be taken as transitional between the wet tropics and the dry tropics. In the hot deserts, heat remains great but moisture is deficient. The polar regions where the heat also is deficient are a logical next great type. Thus the most complex and difficult as well as the most important great group, mid-latitude climates, is left for the last, except for mountain climates.

THE MOTIVATION OF SIXTH GRADE GEOGRAPHY

LA VERA MORGAN
Prince School, Winchester, Mass.

LOSS OF INTEREST THRU LACK OF MOTIVATION

The little people of the fourth grade are having their first lesson in geography. They are enthusiastic and eager. The new books are full of wonderful stories. Stories which will answer the many questions crowding into their alert young minds. As they turn so carefully each page and examine every picture so eagerly, questions come spontaneously to their lips. The lesson seems to carry itself. No need of an urging, coaxing teacher; no need of the purposely motivated questions. The children themselves are the motivation of their own lesson. They are satisfying their own curiosity, filling their own needs, and finding out the wonders of the world in which they live.

Two years pass. The same boys and girls enter the room and meet for the first time the geography work of the sixth grade. They enter listlessly, fall into the seats and "drape" themselves carelessly over the desks. They show only a passing interest in the new books placed before them. They turn, with laborious slowness, to the page directed. What has happened? Where the spontaneous question, the eagerness, where the curiosity? Are these little people so filled with the knowledge of the world that there is no more interest for them in its wonders and its study? Is there nothing left for them to question? Impossible! Why then this change?

INTEREST MAY BE REGAINED

The answer is clear. We have failed to meet the needs of these questioning minds. We have let geography become a lifeless subject and a disappointment to the little folks who had expected it to tell

them a great and marvelous story. Had the work continued to be motivated by the teacher from the first the child would never have lagged and the sixth grade teacher would never have had the problem of awakening or regaining the lost interest of her pupils. There is, under such conditions, but one means of arousing these boys and girls and that is thru themselves. The teacher must utilize the natural instincts of her pupils as a means to the end.

Given a teacher who realizes wherein the failure lies and in a week these young people will be the same eager, curious boys and girls they were when they entered that fourth grade class. The natural desire to do, to question, to live in their study will come again into prominence and the geography lesson will be a joy. To bring this about the "school" atmosphere must—to a reasonable extent—be eliminated both by the attitude of the teacher and the appearance of the room. The student must look upon the teacher and his fellow classmates as companions who, with him, are trying to find out the big "How and Why" of the great world in which he lives. It is easy to have the school room an interesting place. The geography room should be filled with books, pictures, specimens and collections so that the children will be always on the alert in order not to miss seeing some new picture, game or collection recently brought in. I shall speak of ways of obtaining these articles later. Having eliminated to a certain extent the "school" atmosphere both thru a sympathetic attitude (of the teacher) and the pleasant room, the teacher may ask herself how to further awaken this interest in geography which is apparently lost. She will use the very tool that has been overlooked during the last two years—the child himself, for in him lies the means of his own and her salvation. She will utilize his natural instincts of play and imagination, the motor instinct to do, the instinct to collect.

Games Projects

Let us first consider the possibilities of the play instinct. Here of course the geography game is of greatest aid. In most cases it is necessary at first to suggest and direct a game by which cities may be located or other geographical work accomplished. At the close of the first "play lesson" a mere suggestion from the teacher that the class may think up some new and even better games finds every child ready to present a different game to the class the next day. Soon we have many new and joyous ways of playing.

What better project! The child has felt the need of games. In the sixth grade, it does not spoil his fun to realize that the game is

for the definite purpose of helping him remember certain geographic facts. Therefore he not only feels the need but plans and judges the value of his game in accordance whether or not it fulfills its double purpose—fun and usefulness—in helping him gain knowledge. Having planned, judged and made the necessary equipment, he presents his game to the class. It meets the approval of the young critics. Here not only the play instinct is utilized but the little inventor satisfies that craving, common to all humanity, the desire for recognition and approval by one's fellow laborers.

The imagination of the child is utilized to a high degree in the game project. I know of no better means of motivation. The game often envolves the element of "make believe" very strongly. In learning to locate places rapidly we love to make believe our fingers are aeroplanes flying over the country which our map represents. As the captain calls the places we must fly there immediately. If our machines fail to reach the place we must signal distress to our leaders quickly and receive help or be left behind—and sometimes the S. O. S. call is distressing indeed. This game never grows old and locative geography is no longer a Scylla and Charybdis for us.

LETTER WRITING

Sometimes we like to make believe we have visited some far off country or city and tell about it and sometimes we write letters while visiting these places. This "make believe" originated one morning when I found a letter on my desk. This is the story as the little visitor tells it herself in our school paper.

106 Main Street, Pittsburgh, Pa.,
December 14, 1920.

My dear Miss Morgan:

My friend and I have gone all around the wonderful places there are. In most places it was very dirty because they use soft coal and it smokes dreadfully.

They buy coal by the bushel, and we buy it by the ton. That seems very funny to me to buy such a little bit.

You see they don't use coal the way we do. They had natural gas that was discovered about forty or fifty years ago.

Their gas pipes are much larger than ours. The people used to use this natural gas for heating entirely. They had so much of it that they became careless and wasteful. So now, some people have furnaces put in their houses so they can be sure of keeping warm.

Pittsburgh is at the junction of three rivers, the Ohio, the Alleghany, and the Monongahela. It is very hilly. They use little cars to run up and down the hills. They have other factories for the manufacture of glass, steel and iron.

The coal is just outside of Pittsburgh. It is stranger here than it is at home and I will be so glad to get back to Winchester.

Sincerely yours,
Janet Goddard.

Dramatization

Dramatization is another form of game in which every boy and girl will glory. The child of the sixth grade finds nothing incongruous in becoming a river, city or state. He will be glad to represent a river and tell the class the cities by which he passes and what service he gives each one. He will not hesitate to stand before his class and describe the place he is, so accurately, that his little friends may "guess" his name.

Construction Problems

The boys and girls love to make things and it takes very little encouragement or a word of praise from the teacher to secure this form of motivation in her work. At the first of the year it is necessary for the teacher to suggest in detail, the construction of some particular project but I have found that such details are necessary only once or twice. After that the children, if given opportunity, will suggest and ask to make things of their own volition. Day after day boys and girls are coming after class and at the close of school asking for suggestions and permission to "make something" while the more aggressive love to "surprise" the class and teacher by bringing in something they have planned and made by themselves. Very often these projects are group activities rather than individual. Recently we had a lesson in which the working of canal locks was described. The next day two groups of four or five boys each came to me full of excitement to tell that they were constructing canals "with locks that work." Each group was entirely ignorant that the other group was at work on the same project. At the present time we have two canals, a cotton plantation, a model of a coal mine under construction. Each piece of work was suggested, planned and constructed by the children themselves.

We have completed and standing in a place of prominence, a map six by four feet, of New England. Its description by one of the pupils is quite adequate.

A Map of New England

The Prince School is fortunate in having an unusual map of the New England States. This map was constructed by Daniel Dennett and Holbrook Lowell of Division One, and measures six by four feet. It was decided in class to make the map on mahogany. This could not be, however, because mahogany is so expensive. Therefore, beaver board was used. The different states were colored in with water color, and the capitals of each state were represented by electric lights. The rest of the cities were denoted by gold stars. It was difficult to get the outline of the map in proportion so an adult gave help. The rest was done by the two boys. The Geography Room of the Prince School is indeed fortunate in having it.

Daniel Dennett,
Prince School.

We are very proud of this and I feel sure that we will never forget the location of these cities for they have been flashed on and off by every boy and girl.

We have not limited our construction work to geography alone. Our history lends itself wonderfully to this work. The children love to dress Roman and Greek dolls, model the ancient homes, the different Greek columns and we even presumed to construct the Acropolis and place a tiny Parthenon thereon. This sort of work is not only pleasing to the child because he has something material to show for his time spent, but it is gratifying to the teacher. She appreciates this project work because of the material result but even more because rightly guided, it awakens the child's mind and leads to curiosity and questioning.

SPECIAL REPORTS

Wilson has said, "Curiosity will often carry the child forward when once started and will lead to a search for new and interesting data." Problems and questions created by the child himself thru doing are one of the best sort. These easily lead to special reports. These reports will at first be halting and slow. It will mean patience and perseverance on the part of the teacher, but in the end these reports are a most successful form of motivation. At the present time I often feel that there is danger of a riot when I ask, "Who will look this up for us?" so anxious are the little people to have a turn. Some of the children have formed themselves into little "special report clubs" and as one of the children put it when telling me of the plan, "We meet at each other's houses after school to look up something to tell in class and," he added enthusiastically, "we've had one meeting already and we've looked up pearls, oysters and Chesapeake Bay!" The following day the "club" told its accomplishment to the class and other "clubs" followed. Such organization came entirely from the children. The teacher had never thought of asking that children form a club and take their play time for such work. Even the most backward child enjoys this work for will he not be better informed than his classmates on this particular subject? He will for the time being, at least, be on an equal plane with his classmates.

LIBRARY AND COLLECTION PROJECTS

I have found that these reports often are of such a character that the boys and girls may talk them over at home with the parents. Such an assignment as a part of the home work is, I believe, of unequaled value in securing the interest and cooperation of the parents.

This might not be true in all cases, but we are particularly favored with parents who are glad to discuss such questions with their children. The boys and girls very often talk over at home the current events before bringing the clippings into class.

These reports and discussions at home cause the little people to be delighted to bring in books, pictures, etc., on the topics we are discussing. Thus our library was started. This library means much to the children for they have collected the books and magazines and have found in them something they know they can use. They like and use these books far more than those in the regular school library.

We may also use the child's instinct to collect. At first a collection of pictures cut from magazines and newspapers opened the study of a new region. The awakened interest led to the preparation of an attractive and useful collection of pictures. The best pictures were selected and made into a book which becomes a part of the permanent equipment of the geography room.

The collection of pictures has lead very naturally to the collection of articles. Here the correlation of the geography and English department is most practical. Letters are being written to different companies for samples, and the collections thus obtained placed in the geography room. Many interesting articles are brought from the homes having been secured from different firms. While studying New York State, one little lad brought into school the detailed parts of a glove, and after telling specifically about its construction, suggested that the class turn to the map. Then he proceeded to point out the section where the industry was carried on and to tell us the "where and why" of the location.

Thus thru collections of pictures, specimens, and numerous kinds of maps and models the room is a place of interest. Every day the child expects and usually finds some new interest there.

He lives in our work. He is finding out every day more of the mysterious "How and Why" of the great world in which he lives.

THE TRIP TO BLACK BUTTE

JEHIEL S. DAVIS
High School, Calipatria, California

Because of our rather low latitude, about 33° N, very low elevation, 180 feet below sea level, and nearness to the Pacific Ocean, 140 miles, it was not cold when we started on the longest high school geography field trip of the year at daybreak one morning in mid November. We drove south from Calipatria, in Imperial Valley, crossed the Alamo River and had soon passed thru Brawley, Imperial, El Centro, and Heber, so that we arrived in Calexico shortly after eight o'clock in the morning. All the roads we had traveled were of the irrigated type so common in Imperial Valley. Irrigated roads in this section are two broad flat strips of clay with a low bank between so that one side may be flooded while the other is dry. When one side becomes rough it is flooded and the dry side is used. As the water dries out the road is harrowed so that when it becomes perfectly dry and ready for use it is smooth and nearly as good as pavement. The roads of this type, altho usually very fine, become terrible when it rains, which seldom happens in Imperial Valley, and they are sometimes accidentally flooded on both sides at once. Our course was lined mostly with cotton, alfalfa, and milo maze crops, and as we went south, the trees became more numerous and taller indicating that these parts of the valley had been longer under cultivation.

At Calexico, a brief stop was made at the office of the Imperial Irrigation District; then it was necessary to spend some time at the United States Customs Office in order to get our passports to Mexico. We were not in Mexicali much before nine. Mexicali is really the same town as Calexico except that it is on the south side of the red wire fence that marks the international boundary line. We proceeded to the school building, several blocks to the east, and standing close to the border, with its wide veranda overlooking the city park and facing west. We visited the school and were welcomed by the director, who does not speak English, and as we spoke little Spanish the conversation was rather limited. I understand that the school corresponds to our grade school and first two years of high school, altho I believe it is not of quite as high standard. The high school part is regarded as a normal and pupils, mostly girls, train to take positions as teachers. There is a fine assembly hall with some gymnasium

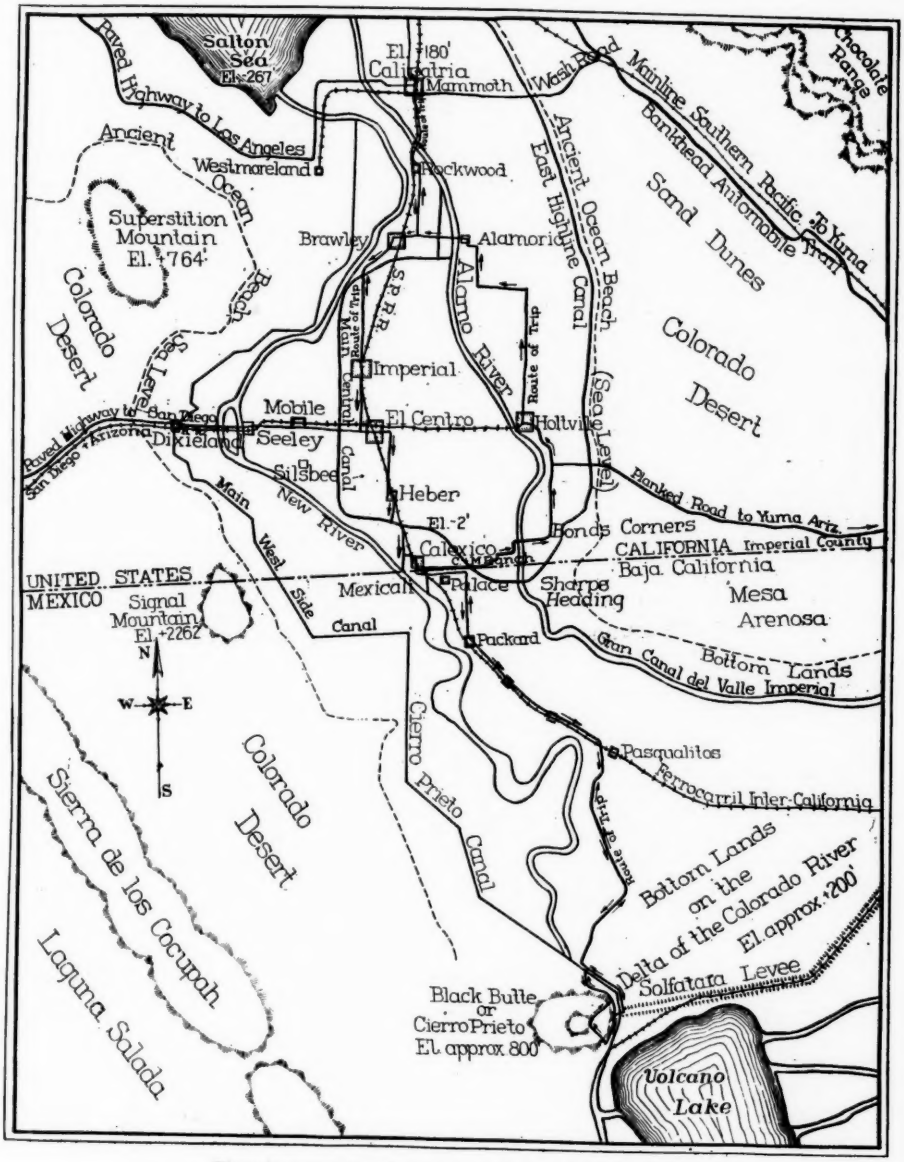
apparatus. Leaving Mexicali, our road led along the border, past the new government palace or capitol of the northern district of Lower or Baja California, then turned south several miles to Packard. There is nothing to tell one that he is in Mexico except that the names on the railroad signs are explained in Spanish. The railroad is a subsidary of the Southern Pacific and is called Ferrocaril Inter-California. Packard is a cotton loading station as were all the other stations we saw. From here on the highway became more and more rutted and dusty. It follows the railroad past two other stations, then crosses and turns southward just before reaching Pasqualitos. As we drew nearer to the ranges which loom to the west Black Butte or Cierro Prieto, our destination, began to stand out. The cotton crops seem to be wonderful, better than I have seen in the valley on the California side. The planters whom we questioned seemed to all be Mexicans of the rather good Mestizo class, but the workers whom we noticed were Japanese and Chinese. We hardly found anyone who could, or at least would, talk English. All talk Spanish except the Chinese, who are a poor type of coolie and we are told they usually refuse to talk at all, as did the one we tried to question. Nearly thirty miles from the United States line, we crossed the large feeder canals and turned southeast along the large Cierro Prieto Canal, then crossed it on a bridge to the home of a Yaqui family where the road rounds a cotton field and leads along the large canal too and around Cierro Prieto and to the end of the Solfarata Levee. There is a railroad along the levee for construction and repair and a station at the foot of the Butte at the headgate. We climed the butte to see the plan of the irrigation works and look over the country. There are a number of small solfataras at the foot of the butte. They are so called because they give out sulfur fumes, mostly in the form of hydrogen sulfide.

The butte is of black cinder and lava about 600 feet above the plain which must be about 200 feet above sea level. It is a volcanic cone with a well formed crater. The crater floor is covered with a flat silt deposit in which there is very little plant life. Many initials have been placed upon this dry flat in stone mosaics and these indicate that many of the visitors are Japanese and many Chinese. Almost nothing grows anywhere on the cone but there are a few plants especially the desert holly. From the edge of the crater, we could study the plan of the irrigation works for miles around and trace the Solfatara Levee and its railroad far to the northeastward towards Pilot Knob, just visible in the misty distance, fifty or more miles away and just over into the United States. North of the levee except for a few

sulfurous or alkaline patches there is cotton, cotton, cotton. South of the levee is the great marsh of partly dry Volcano Lake grown up to patches of green since the Okerson Levee, beyond our vision to the east, forced the great river, the Rio Colorado back into its east channel. This is a duck hunters paradise and we saw them on their way to the hunt, cars from California, from Michigan and elsewhere. Here we gazed down upon the delta of the mighty Colorado which, built as it is across the Gulf of California, has made it possible for the north end of the gulf to dry out leaving us our Imperial Valley and our home below sea level in the ancient ocean bed, the enchanted desert, La Palma de la Mano de Dios. To the west the great desert sweep sparsely bushed separated us from the Cocupah Mountains which hid from our sight the dried out valley of the Laguna Salada, beyond which rise the Coast Ranges.

We made rather good time in covering the thirty-one miles back to Mexicali and crossing into California but evening was approaching and the glory of the sunset came upon field, mountain, sand dune, and sky as it can come in few other parts of the world, except in such desert land at low elevation. Oh! that rich pink which shades to blue in the east over the rows of cream colored dunes and redish purple, bare dissected mountains. None of it can be described.

In the glory of it we rode out of Calexico on the road along the border which passes the magnificent house and grounds of the C. and M. Ranch and the many branching feeder canals from Sharps Heading. We turned north at Bonds Corner and passed the Yuma planked road with its warning not to try to cross the dunes without water and supplies. It was dark when we reached Holtville but we could see enough to get a good idea of what it was like before hurrying on past Alamorio to Calipatria, all of the way thru cotton and alfalfa land, with now and then a crop of milo maize. There is a strip of pavement out of Holtville to the north and all of the important towns we visited have paved streets. We arrived at eight o'clock in the evening, tired from the 126 mile trip, but with sufficient information in our note books to help us much in writing letters to other schools describing our region.



Sketch map showing route of Black Butte trip

STANDARDIZING COURSES OF STUDY IN GEOGRAPHY

Among the important results of the meeting of the National Council of Geography Teachers held in Chicago in December 1920, was the appointment of committees whose duty it is to consider and report means of standardizing courses of study in geography. The investigations are to cover elementary, secondary and normal schools, and the committees are expected to report at the next annual meeting.

The relatively slight attention given to the subject of geography is a matter of common knowledge and greatly to be deplored. This is true because of the loss sustained by our nation as a result of this inadequate treatment, and not because of disappointment on the part of teachers of geography. An earlier content of very little interest and value, coupled with almost uniformly poor teaching, gave geography an inferior position from which it is being slowly raised by the remarkable improvement made during recent years.

The one greatest duty which confronts the National Council of Geography Teachers is that of convincing the public in general, and school authorities in particular, that we have a "new geography" which is of the greatest value to all, and that our country cannot afford to permit its young people to leave the schools and enter upon the affairs of life with little conception of the relations of individuals and nations to geographic conditions.

Importance of Standardization

How can we standardize our courses of study and will standardization bring about the result desired? In the case of material things standardization is of great value. Standards of weights, measures and equipment for engines and machinery of all kinds serves to illustrate its importance. We can to some extent standardize educational opportunity by having school years, months and days of uniform length. It is possible to have standard equipment, to have the grades in which geography shall be taught specified, as well as the divisions and phases of the subject which are to be taught in each grade.

That there is need of setting up certain standards we are convinced; that a certain degree of standardization will improve the teaching of geography we are equally certain and we urge school authorities to cooperate with us in the interests of education. We do not wish it understood, however, that it is our belief that we can buy this means standardize our educational output. Standardization as

applied to instruction is likely to be very deadening. It is not our aim to establish absolutely uniform courses of study or methods of presentation. When in a school system, or individual school, the teachers of a given subject develop a plan whereby each teacher shall on a given day do the same thing in the same manner, the result is deplorable. The writer has heard superintendents boast that they could at any given minute in a school-day tell exactly what was going on in each and every room in their systems!

We can bring about a certain degree of unification as to physical equipment, time, content of courses and therefore as to the value of instruction. Such standardization would give more meaning than now attaches to our work. Within reasonable limits we should know what is meant by fourth grade or eighth grade geography. The designations applied to courses in high and normal schools should have a reasonably definite meaning.

Elementary School Geography

Our committee on elementary school geography has before it a great task and a great opportunity. Larger uniformity is desirable as to the distribution of geography by grades. In some systems the subject is taught from the first to the eighth grades inclusive, in some from the fourth to the eighth, but in comparatively few beyond the seventh grade. It is not important that the teaching of geography begin earlier than the third grade but it should in all systems *be continued thru the eighth grade.* That some of the upper grade work is in many places classed as "intermediate" or "junior high" does not change the situation. The use of a term for the purpose of classification in no way lessens the need of our pupils for a knowledge of geography.

Great improvement would result by discarding our present method of having two books cover the field. That we need a book or books for each grade there can be no doubt. Cost, the argument raised against the adoption of this plan, is given too much weight.

In the matter of introducing geography into the elementary schools, much improvement can be brought about. All of our recent texts employ the best method of introduction now known but the treatment, no matter how masterly, is of necessity confined to a few pages. This robs the work of much of its possible value.

What is needed is material of this same nature expanded into several small books presenting the fundamental topics of food, clothing, shelter, transportation and communication. Into this there should be

woven references to climate, topography and human customs, but all focused upon daily life at home and abroad. All children are deeply interested in this work, and it leads most helpfully and naturally to the more definite study of continents and countries.

SECONDARY SCHOOL GEOGRAPHY

The curricula of our secondary schools present a most remarkable and unfortunate situation. That branch of science which more than any other furnishes an interpretation of the life of man is generally entirely omitted. General science has quite largely displaced physiography. Without question the work in general science is of much value but it is equally certain that, as compared with a well organized course in geography, its value is relatively slight.

The large omission of geography from our secondary schools is one of the weakest spots in our educational scheme. High school students, no matter what course they are taking, should be advised if not required to take geography for one year. The work should consist of three large units: humanized physical geography as the necessary foundation, economic geography with world application, and the regional geography of the United States. Standardizing high school geography to the extent indicated, would result in great good.

NORMAL SCHOOL GEOGRAPHY

The crux of the whole situation, so far as bringing about improvement is concerned, is to be found in our teacher-training institutions. "As is the teacher, so is the school." Teachers cannot teach that which they do not know and at present neither opportunity nor requirement are such as to furnish teachers with adequate preparation.

Various studies of normal schools have shown that in very many of them no geography is required. Such a condition is almost unbelievable and is entirely inexcusable. It is earnestly hoped that faculties of normal schools thruout the United States will join with our committee in the effort to make one year in geography a standard requirement for graduation.

As the function of the normal school is to furnish preparation for teaching, the normal school work in geography should obviously be in subject matter. In those schools having differentiated curricula, there should be a course in geography for the lower grades and one for the higher grades. In many of the normal schools the geography now offered is a "review" of elementary school geography. This is an important factor in preventing a high standard of teaching.

GEOGRAPHICAL PUBLICATIONS

Jean Brunhes. **Human Geography**. Translated by T. C. LeCompte and edited by Isaiah Bowman and Richard E. Dodge. ix and 648 pp. 223 illustrations. Indexes of names and subjects. Rand, McNally, Chicago. 1920. $5.00.

Brunhes's "Human Geography" comes as a refreshing experience in the days of dull readings of revised editions and post-war rehashings of our textbooks. The point of view which the author has taken in the presentation is a strange one and for that reason it is invaluable for the student of geography. It is not a book for the beginner in the science; it is for the advanced student. Furthermore it is not a very readable volume; but it yields a high return for study. In other words, the book is a study book not a reading book. The author has drawn illustrations from the remote corners of the earth. He has therefore given to American readers treatments as types of regions not commonly reported.

The main headings, Classifying the Facts of Human Geography; Unproductive Occupation of the Soil; Facts of Plant and Animal Conquest; Facts of Destructive Exploitation; Small Natural Units; and Beyond the Essential Facts display only the scope of the work; but the infinite detail with which some of these are worked out can only be appreciated by a somewhat careful study of the volume.

Geographers owe their thanks to the editors for the labor of making a book of this character available.

Robert M. Brown

College of Education,
Providence, R. I.

James F. Chamberlain. **Geography, Physical, Economic and Regional.** 509 pp., 192 ills., 17 maps, index. J. B. Lippincott Co., Philadelphia. 1921. $2.80 net.

Chamberlain's Geography is a well written and attractively illustrated text. It differs from most other high school geographies, in covering the regional geography of the United States, the physical and economic geography, and in its emphasis of causal relations. It is the first high school text, in accord with the new ideas of geography, that covers the field adequately.

The first one third of the book is devoted to physical geography emphasizing the effect of environment upon man. The next 200 pages are devoted to agriculture and agricultural products, forests and man, animals and their relation to man, minerals in their relation to man, and transportation and communication. The last part is an intensive study of the regional geography of the United States which is discussed as follows: New England, New York State, Atlantic Coastal Plain, Gulf Plain, Appalachian Province, East Central States, West Central States, Rocky Mountain and Great Basin Provinces, Pacific Coast, Alaska and the Insular Possessions of the United States, among which, however, the author fails to mention the Virgin Islands.

It is not possible to cover in a single year's course all that is usually included in high school physiography, commercial geography, and elementary geography. What should be omitted is a matter of opinion but the reviewer regrets that foreign trade and the com-

mercial geography of the world outside of the United States receives but the briefest mention. No mention is made of dry land farming, and the statement on page 442 that "west of the hundredth meridian the rainfall is in most sections less than twenty inches annually and therefore not sufficient for agriculture" has been frequently made by others as well but is far from being unqualifiedly true. Success in dry land farming depends on seasonal distribution of rainfall and rate of evaporation as well as the total amount of rainfall, and a mean annual total that would be inadequate in Texas is sufficient for crops in the northern Great Plains.

Desirable features of the text are the lists of references and suggested studies at the end of each chapter, and an index of authors as well as the usual index of subjects. The book can be recommended for use in secondary schools and the author and the publishers should be complimented upon producing such a useful and teachable text.

O. W. FREEMAN

High School,
Stockton, Calif.

Frank McMurry and A. E. Parkins. **Elementary Geography.** 313 pp., 323 maps, photos, and diagrams. Macmillan Co., New York. 1921.

To be reviewed later.

J. Russell Smith. **Human Geography, Part I, Peoples and Countries.** 369 pp., 502 maps, photos, and diagrams. John C. Winston Co., Phil. 1921.

To be reviewed later.

Louise W. Mears. **Outlines for the Study of Geographical Stories.** Pub. by the author, State Normal School, Milwaukee, Wis. 1921. 50 cents.

The outlines are in questionnaire form covering eleven geographical stories which deal with nature. Among the stories thus treated are: Kipling: Captains Courageous; Waterloo: The Story of Ab; Peary: The Snow Baby; Andrew: The Little Mountain Maid; Muir: Stickeen; Defoe: Robinson Crusoe; Andrews: Gemilla, The Child of the Desert.

Douglas C. Ridgley and Jessie M. Dillon. **Home Geography.** 128 pp. McKnight and McKnight, Normal, Ill. 1921. 65 cents.

Home Geography is a first year text in geography and is prepared in such a flexible form that it may be used in any school system. To accomplish this difficult purpose the authors have provided material not only in great abundance but in well chosen variety. It should be possible for the rural, small town, or city teacher to select material for a year's work.

Max Roesler. **The Iron Ore Resources of Europe.** 152 pp., 19 plates, 33 figures. Bulletin 706. U. S. Geol. Sur., Washington. 1921. Free.

The bulletin deals with the location, extent, and character of the deposits, and classifies the reserves under three heads—known, probable, and possible. By a colored circle scheme the known, probable and possible reserves are shown on the maps. This volume makes available to American readers, for the first time, authentic data on European iron ores. It is invaluable to every teacher of geography.

David G. Thompson. **Routes to Desert Watering Places in the Mohave Desert Region, California.** 269 pp., 18 plates, 3 figures. Water Supply Paper 490–B. U. S. Geol. Sur., Washington. 1921. Free.

A. C. Yate. **Baku and the Caspian.** 2 photos. *Scot. Geog. Mag.*, Oct., 1920, p. 254.

William LaVarre. **Brazil's White Gold.** 8 photos. *Bull. Pan Am. Union*, Nov., 1920, p. 462.

An account of the rubber industry.

Cyro Cordeiro e Faria. **The Economic Situation of Rio Grande Do Sul, Brazil.** 6 photos. *Bull. Pan Am. Union*, Nov., 1920, p. 488.

Frank H. Simonds. **The Armistice of Riga.** 2 maps. *Rev. of Rev.*, Nov., 1920. p. 487.

Discusses the new boundaries of Poland and the resulting change of power among European countries.

William B. Shaw. **Our Three Centuries of Expansion.** 1 map, 3 photos. *Rev. of Rev.*, Nov., 1920. p. 597.

A review of the growth of the United States in connection with the Tercentenary Movement.

Paul V. Collins. **The Lumber Famine.** 9 ills. *Rev. of Rev.*, Nov., 1920. p. 521.

A review of the United States lumber industry.

J. G. B. Corderio. **Glacial and Genial Epochs.** *Sc. Am. Mo.*, Nov., 1920, p. 197.

An astronomical explanation of the glacial periods.

Edward W. Perry. **The Ancestors of the Sequoias.** 2 maps. *Sc. Am. Mo.*, Nov., 1920, p. 207.

Guillaume Grandidier. **Madagascar.** 2 maps, 20 photos. *Geog. Rev.*, Oct., 1920, p. 197.

Alexander G. Ruthven. **The Environmental Factors in the Distribution of Animals.** *Geog. Rev.*, Oct., 1920, p. 241.

L. F. I. Athill. **Thru South-Western Abyssinia to the Nile.** 2 maps, 8 photos. *Geog. Jour.*, Nov., 1920, p. 347.

J. Stevenson-Hamilton. **The Dinka Country East of the Bahr-El-Gebel.** 1 map, 5 photos. *Geog. Jour.*, Nov., 1920, p. 389.

Robertson Scott. **The Way of the Farmer in Japan.** Many photos. *Asia*, Oct., Nov., Dec., 1920.

John Knight Shryock. **Kingtehchen, The Porcelain City.** 9 photos. *Asia*, Nov., 1920, p. 997.